DEC STD 052-3 Automatic Calling and/or Answering Equipment On the GSTN Using the 100 Series Interchange Circuits

DOCUMENT IDENTIFIER: A-DS-EL00052-03-0 Rev A1, 26-Jan-1990

ABSTRACT: Describes the sequence of events involved in establishing a connection between an automatic calling data station and an automatic answering data station for V.-series Recommendation modems specified for General Switched Telephone Network operation (GSTN). The system configuration is shown in Figure 1. The information contained in this document has been extracted from CCITT Study Group XVII, Working Parties XVII/1, 2, and 3.

APPLICABILITY: The requirements are intended to be suitable for the following four types of call:

a. Automatic calling data station to automatic answering data station.

b. Manual calling data station to automatic answering data station.

c. Automatic calling data station to manual answering data station.

d. Disabling of echo suppressors in the case of communication between manual data stations.

The 108.1 Direct Call method is not supported by this standard.

STATUS: APPROVED 26-Jan-1990; use VTX SMC for current status.

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REVISION HISTORY:	Rev A,	30-Sep-1987	
	Rev A1,	26-Jan-1990	ECO Number CTS01

Document Management Category:	Regulatory Compliance - Telecommunications (HRT)
Responsible Department:	NAC: Communication System Engineering
Responsible Person:	Jan Purwin

APPROVAL: This standard has been reviewed and recommended for approval by the General Review Group for its category. Rev A1 incorporates clerical changes only.

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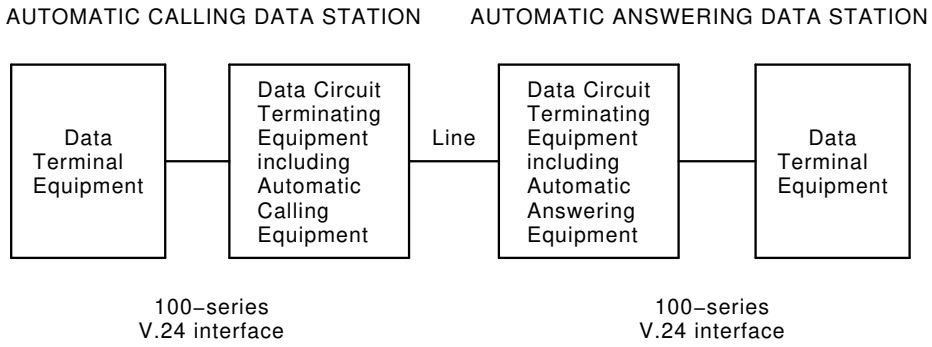
1 INTRODUCTION

1.1 PURPOSE

This standard is concerned with the setting up of a data connection on the General Switched Telephone Network (GSTN) where the automatic calling equipment used interfaces to the data terminal equipment via the 100 series interchange circuits.

The standard describes the sequence of events involved in establishing a connection between an automatic calling data station and an automatic answering data station for V.-series Recommendation modems specified for GSTN operation. The system configuration is shown in Figure 1.

Figure 1: Proposed System Configuration for Data Transmission Over GSTN


AUTOMATIC CALLING DATA STATION
AUTOMATIC ANSWERING DATA STATION
Data Terminal Equipment
Data Circuit Terminating Equipment including Automatic Calling Equipment
Line
Data Circuit Terminating Equipment including Automatic Answering Equipment
Data Terminal Equipment
100–series V.24 interface
100–series V.24 interface

This standard deals with call establishment and clearing. Any specific use of Recommendation V.24 (List of Definitions for Interchange Circuits Between Data Terminal Equipment and Data Circuit Terminating Equipment, hereafter referred to as V.24) interchange circuits herein described, only applies during these phases. The management of interchange circuits and the line during the data transmission phase is not part of this recommendation. Details of interface procedures following the OFF to ON transition of circuit 107_CC_DSR upon entry of the data transmission phase can be found in the relevant modem recommendations. See *DEC STD 052-2 Electrical Requirements for Binary Interfaces That Conform to EIA RS-232-C or CCITT V.28 Modems*.

NOTE

The term "data station" in this standard is synonymous with the term "terminal installation for data transmission".

1.2 SCOPE

It is intended that Data Terminal Equipment (DTE) designed to control automatic calling equipment in accordance with this standard will also be suitable for use with manually controlled Data Circuit-Terminating Equipment (DCE). Also that DCE incorporating automatic calling equipment may interwork with other types of DTE when the former is manually controlled.

The DTE is responsible for:

a. During call establishment:

  1. Ensuring that the DCE is available for operation.

  2. Providing the telephone number, or selecting a telephone number pre-programmed into the DCE.

  3. Deciding to abandon the call if unsuccessfully completed.

b. After call establishment:

  1. Controlling data transfer.

  2. Initiating disconnect at calling or answering data stations.

Automatic calling equipment conforming to procedures described in this standard shall interwork with automatic answering equipment conforming to Recommendation V.25 (Automatic Calling and/or Answering on the GSTN, including Disabling of Echo-Suppressers on Manually Established Calls, hereafter referred to as V.25).

Similarly, the procedures herein described for automatic answering allow interworking with automatic calling equipment conforming to V.25.

The procedures are intended to be suitable for the following four types of call:

a. Automatic calling data station to automatic answering data station.

b. Manual calling data station to automatic answering data station.

c. Automatic calling data station to manual answering data station.

d. Disabling of echo suppressors in the case of communication between manual data stations.

The automatic calling and/or answering data station can be operated as follows: The 108.2 (DTR) Addressed Call and/or Answer Authorized by the DTE mode gives at a calling data station extensive call capacities by means of instructions exchanged between the DTE and the DCE on circuits 103_BA_TD and 104_BB_RD. It gives to an answering data station the capacity to accept "a priori" the eventual incoming call.

NOTE

The 108.1 Direct Call method is not supported by this standard.

1.3 ABBREVIATIONS AND DEFINITIONS

The following abbreviations are used in this standard:

DCE - Data Circuit-Terminating Equipment (Modem)

DTE - Data Terminal Equipment (Terminal or Computer Device)

GSTN - General Switched Telephone Network

HDLC - High Level Data Link Control

MC - Maintenance Center

The following definitions apply to this standard:

Command - An instruction issued by the DTE to the DCE as part of the automatic calling procedure.

Indication - An instruction or response issued by the DCE to the DTE as part of the automatic calling procedure.

Parameter - A variable which may accompany Commands or Indications.

Calling tone - The tone transmitted from the calling end.

Answering tone - The tone transmitted from the called end.

Appendix A gives guidance on the maintenance capabilities which may be associated with an automatic calling DCE. Methods for testing the Automatic calling functions of the DCE are included.

2 108.2 ADDRESSED CALL AND/OR ANSWER AUTHORIZED BY THE DTE

2.1 INTERFACE PROCEDURE

2.1.1 Interchange Circuits Involved

The interchange circuits used in the automatic calling/answering procedure are listed in Table 1.

Table 1: Interchange Circuits Used in Automatic Calling/Answering

Interchange Circuit		Direction	
Nomenclature CCITT EIA DEC	Name	From DCE	From DTE
103_BA_TD	Transmitted Data		X
104_BB_RD	Received Data	X	
105_CA-RTS	Request to Send		
106_CB_CTS	Ready for Sending	X	
107_CC_DSR	Data Set Ready	X	
108.2_CD_DTR	Data Terminal Ready		X
125_CE_RI	Calling Indicator	X	

NOTE

The 109_CF_CD can be optionally provided by some administrative modems.

Circuit 103_BA_TD: Transmitted Data The instructions issued by the DTE during the automatic calling procedure, known as Commands, are transmitted to the DCE on this circuit.

Circuit 105_CA_RTS: Request to Send

Circuit 104_BB_RD: Received Data Responses from the DCE to DTE Commands, known as Indications, are transmitted to the DTE on this circuit.

Circuit 106_CB_CTS: Ready for Sending The DCE shall turn circuit 106_CB_CTS ON:

a. In response of the DTEs circuit 108.2_CS_DTR being ON.

The DCE shall turn circuit 106_CB_CTS OFF:

a. On connection to line when answering tone is detected.

b. When the DCE aborts the call set-up under the control of DTE which turning circuit 108.2_CD_DTR to the OFF condition.

Circuit 107_CC_DSR: Data Set Ready The DCE shall turn circuit 107_CC_DSR ON:

a. At the end of the automatic call set-up procedure, to indicate to the DTE that the connection is established and that the DCE is connected to line.

The DCE shall turn Circuit 107_CC_DSR OFF:

a. To indicate to the DTE that the connection has been disconnected during the data transfer phase (to be permitted where national regulations require it).

b. In response to a clear request by the DTE turning circuit 108.2_CD_DTR OFF.

c. As a reaction to disconnect of circuit 108_CD_DTR with 1 second time delay.

Circuit 108.2_CD_DTR: Data Terminal Ready (DTR) The DTE turns circuit 108.2_CD_DTR ON:

a. To enable the DCE to set-up a connection either manually or automatically.

b. To indicate to the DCE that it is ready to accept an incoming call.

The DTE shall turn circuit 108.2_CD_DTR OFF:

a. To instruct the DCE to clear down the connection during data transfer.

b. To instruct the DCE to abort the call set-up procedure.

c. To indicate to the DCE that it is not ready to accept an incoming call.

Circuit 109_CF_CD: Carrier Detect The carrier detect circuit might be implemented on some DCEs. When implemented it will follow circuit 106_CB_CTS.

NOTE

The DTE must recognize ON state of 106_CB_CTS and may additionally recognize 109_CF_CD before executing commands to the DCE.

Circuit 125_CE_RI: Calling Indicator (CI) The DCE should provide circuit 125_CE_RI (CI) to indicate to the DTE an incoming call. The incoming call will override a call request prior to seizure of the line. The use of circuit 125_CE_RI in the DTE is optional.

Other Interchange Circuits The state of other interchange circuits is not part of this procedure. However, to ensure maximum compatibility with existing equipment, the other interchange circuits provided should retain their normal function during the automatic calling procedure. Particularly, the condition of circuit 109_CF_CD shall follow the condition of circuit 106_CB_CTS, and the DTE may choose to hold circuit 105_CA_RTS ON during the automatic calling procedure (though the DCE is not required to recognize this).

2.1.2 Control Information Format

Call set-up is achieved by the use of interchange circuits 106_CB_CTS, 107_CC_DSR and 108.2_CD_DTR together with messages exchanged between the DTE and DCE on circuits 103_BA_TD and 104_BB_RD. These messages consist of Commands or Indications from the DTE or DCE respectively, and may be accompanied by Parameters where necessary. The Commands and Indications required for the automatic calling procedure are outlined in Tables 2 and 3, together with their parameters. The use of Commands/Indications other than the Call Request is optional in the DTE and DCE respectively. The Commands and Indications and their parameters are described below.

Call Request - This command from the DTE instructs the DCE to initiate a call set-up procedure. The command shall be accompanied by one of the following parameters, and shall include a suffix to indicate the type of call request concerned (see Table 3):

a. The number to be dialed (in applications where additional dial tones are required, separators, "Wait Tone" and so forth may be included in this number).

b. The DCE memory address which contains the number to be dialed, this having been previously programmed.

c. Double dial-up parameters (For further study).

d. The identification number of the remote Data Station.

Program - This command from the DTE instructs the DCE to enter a programming state. The command shall be accompanied by one or more of the following parameters:

a. The DCE memory address into which the number to be dialed is to be stored.

b. The number which is to be stored.

c. Double dial-up parameters (For further study).

d. The identification number of the Data Station.

For normal programming operations, the command shall be followed by the memory address, then the dialed number. For double dial-up programming, use a separate suffix on the program command. See Table 3. Where a DCE does not contain the programming capability, the lack of response from the DCE to a program command shall be interpreted by the DTE by means of a time out as a programming failure. This may also be indicated by an Invalid indication from the DCE.

Where a DTE is not capable of programming the DCE, it may still initiate call attempts using the standard Call Request command.

Table 2: Set of Commands and Indications

Command/Indication	DTE to DCE	DCE to DTE	Parameters
Call Request	X		Dialed number Memory address of dialed number Double dial-up request Identification number
Program	X		Dialed Number Memory address for dialed number Identification number
List Request	X		For further study
Disregard Incoming Call	X		None
Connect Incoming Call	X		None Engaged tone
Call Failure		X	Number not stored DCE busy Ring Tone (time out) Abort Call (Time out) V.25 answer tone not detected Forbidden call *
Delayed Call		X	Time to permissible call request (minutes)
Valid		X	No parameter
Invalid		X	For further study
List		X	Memory address Number to be dialed Status Identification Number

* Nationally dependent parameters

NOTE

DTE manufacturers - a set of indications may not be implemented in every DCE. Allow for this by providing suitable time outs.

List Request - This command from the DTE instructs the DCE to list the numbers that have been programmed in its memory together with their status. The command shall include a suffix to indicate the type of list. The command may be accompanied by parameters to select the items to be listed. These parameters are for further study.

Disregard Incoming Call - This command from the DTE instructs the DCE not to answer the incoming call that has just been previously signaled by the DCE. However, the DTR will maintain circuit 108.2_CD_DTR in the ON condition for programming purposes.

Call Failure - This indication may be issued by the DCE in response to a Call Request command from the DTE. The Indication may be accompanied by a parameter stating the reason for the failure of the call. The following parameters indicate the possible conditions that may result in a call failure on the GSTN:

a. Engaged Tone

b. Number Not Stored

c. DCE Busy

d. Ring Tone (Time out)

e. Abort Call (Time out)

f. Answer Tone Not detected

g. Forbidden Call

h. Other parameters dependent on national network variations

The provision of the Call Failure indication is optional in the DCE. For this reason, the DTE should also be capable of recognizing call failure by means of a time out. (Time out 60 s <= T <= 120 s)

Delayed Call Indicator - Depending on national regulations, this indication from the DCE may by implemented to inform the DTE that, owing to repeated unsuccessful call attempts, no further call attempts will be accepted for a time specified by the accompanying parameter.

Incoming Call - This indication may be provided by the DCE to inform the DTE that a ring tone has been detected on the telephone line.

NOTE

In the event of collision between an incoming call and a call request, the incoming call will have priority.

Table 3: Encoding of Commands and Indications

Command / Indication	ASCII Chars	Parameter (see Key)
Call Request with;		
Number provided	CRN	CRN (nd)
Number provided with identification number	CRI	CRI (nd); (in)
Memory address provided	CRS	CRS (ma)
Double dial up required	CRD	CRD (fs)
Program;		
Normal	PRN	PRN (ma); (nd)
Double dial up	PRD	PRD (fs)
Identification	PRI	PRI (in)
List Request of;		
Stored numbers	RLN	RLN (ma); (nd)
Forbidden numbers	RLF	RLF
Delayed call numbers	RLD	RLD
Identification	RLI	RLI
List of;		
Stored numbers	LSN	LSN (ma); (nd); (fs)
Forbidden numbers	LSF	LSF (ma); (nd); (fs)
Delayed call numbers	LSD	LSD (ma); (nd); (fs)
Identification	LSI	LSI (in)
Disregard incoming call	DIC	DIC
Connect incoming call	CIC	CIC
Call failure indication	CFI	CFI (PM)
Delayed call	DLC	DLC (TD)
Incoming call	INC	INC
Valid	VAL	VAL
Invalid	INV	INV

Parameter Key: All parameters in the form xxxxx.....x; unless otherwise noted.
nd - Number to be dialed.
in - Identification number.
ma - Memory address.
fs - For further study.
pm - Parameter (form xx).
td - Time duration (in minutes)

Valid - This indication may be provided by the DCE to acknowledge a program command, and to inform the DTE that the command has been accepted.

Invalid - This indication may be provided by the DCE when it receives an invalid command, or receives a command which it is incapable of executing. The use of parameters with this indication is for further study.

List - The DCE shall provide a series of indications that list specific items stored in its memory according to the previous DTE List Request. This indication will be accompanied by one or more of the following parameters:

a. The DCE memory address into which the number is stored.

b. The number stored.

c. The status of this number.

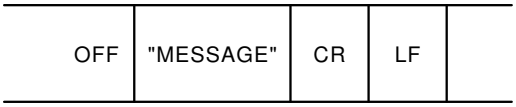
d. The identification number of the Data Station.

2.1.3 Format for Commands and Indications

Commands and indications may be encoded in the formats specified below, according to application.

2.1.3.1 Asynchronous Operation - The format for asynchronous operation shall be as shown in Figure 2.

Figure 2: Format for Asynchronous Operation



NOTE

In commands from the DTE, the New Line function may sometimes be encoded in a format other than CR + LF (refer to Recommendation V.3, Table 3-1, Note 1). Allowance for this should be provided.

In this mode of operation, the character format shall be one start element followed by eight data units and a one unit stop element. The eight data units are formed by a 7-unit ASCII character together with an even parity unit.

Where the DCE operating rate is variable, the transmission rate for commands and parameters should be the maximum data rate permitted by the modem recommendation, for example:

300, 600, 1200 and 2400 bit/s.

2.1.3.2 Synchronous Character Oriented Operation - The format for synchronous character oriented operation shall be in accordance with International Standard ISO 1745, and shall be as shown in Figure 3.

In this mode of operation consecutive 8-bit data units are used. The 8-bit data units are formed by a 7-bit ASCII character with an odd parity bit.

Figure 3: Format for Synchronous Character Oriented Operation

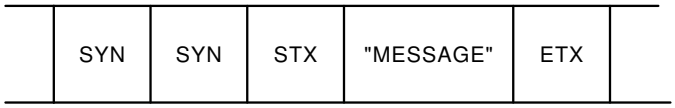


Figure 4: Format for Synchronous Bit Oriented Operation

The same bit rate used for the data transfer shall be used for this operation.

Synchronous Bit Oriented Operation - HDLC format shall be used for synchronous bit oriented operation, and shall be as shown in Figure 4.

The message is the information field of a UI frame transmitted with the P bit set to 1 and the global address. Consequently the A and C fields are as follows:

A = 11111111, C = 11001000

The introduction of other addresses is for further study. The use of a P bit set to 0 for signaling the introduction of other commands/ indications is also for further study.

Within the message, consecutive 8-bit data units are used and submitted to the HDLC framing (zero insertion). The 8-bit data units are formed by a 7-unit ASCII character in accordance with V.3 together with an odd parity unit in accordance with V.4.

The same transmission mode and bit rate used for the data transfer shall be used for this operation.

2.1.4 Message Format and Encoding

The message format shall be comprised of:

a. A 3-character command/indication (see Table 3).

b. One or more parameters separated by a semicolon (;) (see Table 4).

Table 4: Parameters Alphabet

Parameter	ASCII Coding
0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
Wait Tone	:
Separator 2 *	<
Separator 3 *	=
Separator 4 *	>
Engaged Tone	ET
Number Not Stored	NS
DCE Busy	CB
Ring Tone	RT
ABORT CALL	AB
Answer Tone Not Detected	NT
Forbidden Call	FC
Parameter Delimiter	;

* Note: For national use.

For Germany, FTZ had designated separators as follows:
"Separator 2" should be replaced with "dial tone pause (1s)"
"Separator 3" should be replaced with " dial tone pause (3s)"
"Separator 4, parameter ">", is reserved for active earth key
(Erdtaste betaetigen) = ground start in private exchange systems

2.1.5 Command/Indication Exchange Protocol

The exchange of commands and indications between the DTE and the DCE can be regarded as asynchronous and balanced.

The following basic rules apply:

a. Every command is to be followed by at least one indication, or by circuit 107 (DSR) going ON in the case of a successful call.

b. Several indications may be issued by the DCE one after the other, either of the same nature, or of a different nature.

c. The issue by the DTE of several commands one after the other is for further study.

2.1.6 Erroneous Command/Indication

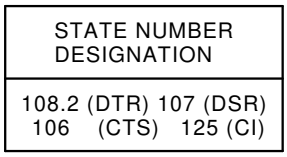
a. Whenever a command/indication is detected with a level II framing error (incorrect framing, parity, or CRC) this command/indication is disregarded.

b. Whenever a DCE detects an error in the message of a command, it acknowledges negatively this command by issuing an "Invalid" indication (INV).

2.2 INTERFACE PROCEDURE AT THE CALLING DATA STATION (PROVISIONAL)

The DTE/DCE interface procedure for automatic calling and answering is shown in the state diagram in Figure 6. Figure 5 shows the flow chart symbols used to describe the modem control sequences of the DTE.

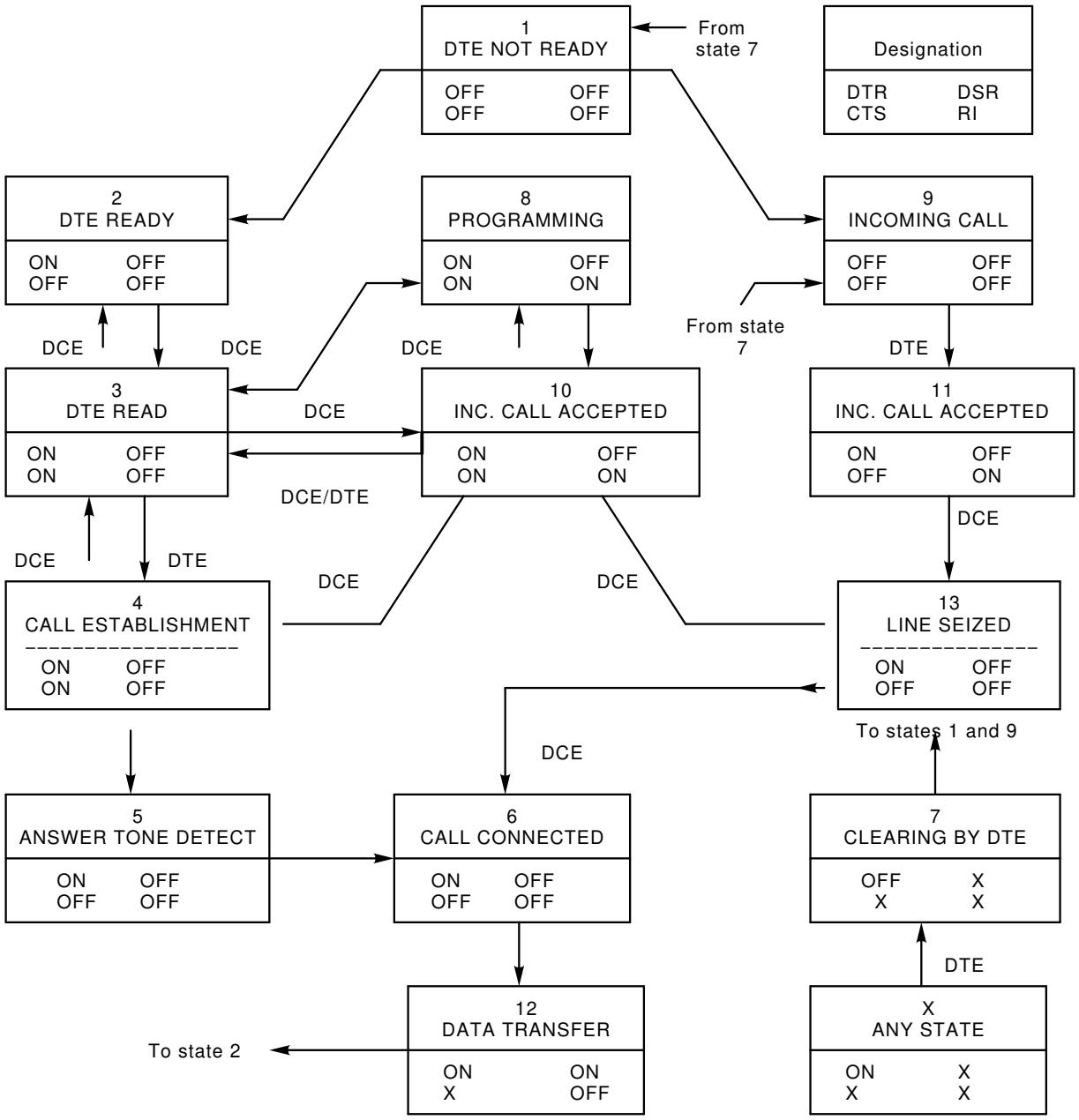
Figure 5: Legend for State Diagram



"X" denotes a 'don't care' state of the indicated signal.

The state symbols represent interface states as seen between DTE and DCE. The DTE is assumed to control transitions from one state to another. The time values indicate maximum wait time for DCE signal to become true.

Figure 6: DTE/DCE Automatic Calling and Answering Interface Procedure



The call set-up procedure is as follows:

a. When the DTE is not ready to answer an incoming call or to set-up a call, the interface is in state 1, "DTE Not Ready" (108.2 = OFF, 106 = OFF).

b. Prior to asking for call set-up, the DTE shall signal 108.2 = ON. The interface is now in state 2, "DTE Ready".

c. The DCE signals to the DTE that it is ready to enter the call set-up phase by signaling 106 (CTS) = ON. This is state 3, "DCE Ready". In this state, the DTE issues Commands and the DCE may issue Indications.

d. To initiate call set-up, the DTE shall issue a "Call Request" command and move to state 4, "Call Establishment". If the "Call Request" command contains a GSTN number, the DCE shall proceed with the call set-up procedure. If it contains a DCE memory address, the DCE shall use its stored number.

e. The DCE remains in state 4 during the dialing process.

f. If the call fails, the DCE may issue Call Failure Indications while in state 4 and return to state 3. During transmission of a calling station identification, and the subsequent disconnection from the line following a call failure, the DCE may turn circuit 106 (CTS) OFF, and return to state 2 if it is not capable of handling new commands from the DTE.

g. If the call is established and the 2100 Hz answering tone is detected (see subhead 4.1) the interface moves to state 5 "Answer Tone Detected" and circuit 106 (CTS) is turned OFF.

h. On completion of the line procedures (see subhead 4.1) circuit 107 (DSR) is turned ON, and the interface moves to state 6, "Call Connected". From this state the DTE may enter the "Data Transfer" phase, state 12, in the normal manner.

i. While the DCE is in either state 3, state 4 prior to going "Off Hook", or state 8, an incoming call shall be signaled to the DTE using circuit 125 (CI) and/or using the "Incoming Call" indication. The interface then moves to state 10, "Incoming Call Accepting". If the DTE wishes at this state not to answer the call, it may issue a "Disregard Incoming Call" command. The collision of a call request with an incoming call before the latter has been detected is for further study.

j. The DTE may clear a call or call attempt at any time by turning circuit 108.2 (DTR) OFF. The interface is now in state 7, "Clearing by DTE". The interface will then move to state 1 for circuit 125 (CI) OFF, or state 8 for circuit 125 (CI) ON.

k. From "DCE Ready" (state 3) the DTE may enter the "Programming State", state 8, to store GSTN numbers in the DCE memory or interrogate the DCE memory. The interface returns to state 3 upon completion of the programming exercise.

l. When an incoming call occurs during the "Programming State" (state 8) the DCE shall, if possible, complete the programming exercise before accepting the call. This is accomplished by issuing a "Disregard Incoming Call" command.

2.3 INTERFACE PROCEDURE AT THE CALLED DATA STATION

The states involved in automatic answering are shown on the right hand side of the state diagram in Figure 5, and the procedure is as follows:

a. Whenever the DTE is ready to answer an incoming call, it turns circuit 108.2 (DTR) ON, and moves from state 1, "DTE Not Ready", to state 2, "DTE Ready". The DCE will normally respond by turning circuit 106 (CTS) ON, thus entering state 3, "DCE Ready".

b. An incoming call is indicated to the DTE using circuit 125 (CI) and/or optionally with an "Incoming Call" indication, and by this means moving the interface from states 3, 4 or 8, to state 10, "Incoming Call Accepting". (In the case of state 4, the incoming call may only be detected prior to the DCE going "Off Hook").

c. While in state 10, the DTE may reject the incoming call by turning circuit 108.2 (DTR) OFF or issuing a "Disregard Incoming Call" Command. If this is not done within a period determined by national regulations, the DCE shall accept the call and move to state 13 "Line Seized", turning circuit 106 (CTS) OFF while circuit 125 (CI) is also going OFF.

d. If an incoming call occurs when the DTE is "Not Ready" for example, circuit 108.2 (DTR) OFF, the DCE moves to state 9 "Incoming Call". The DTE may choose to accept the call by turning circuit 108.2 (DTR) ON. The DCE may then move to state 11, "Call Accepted".

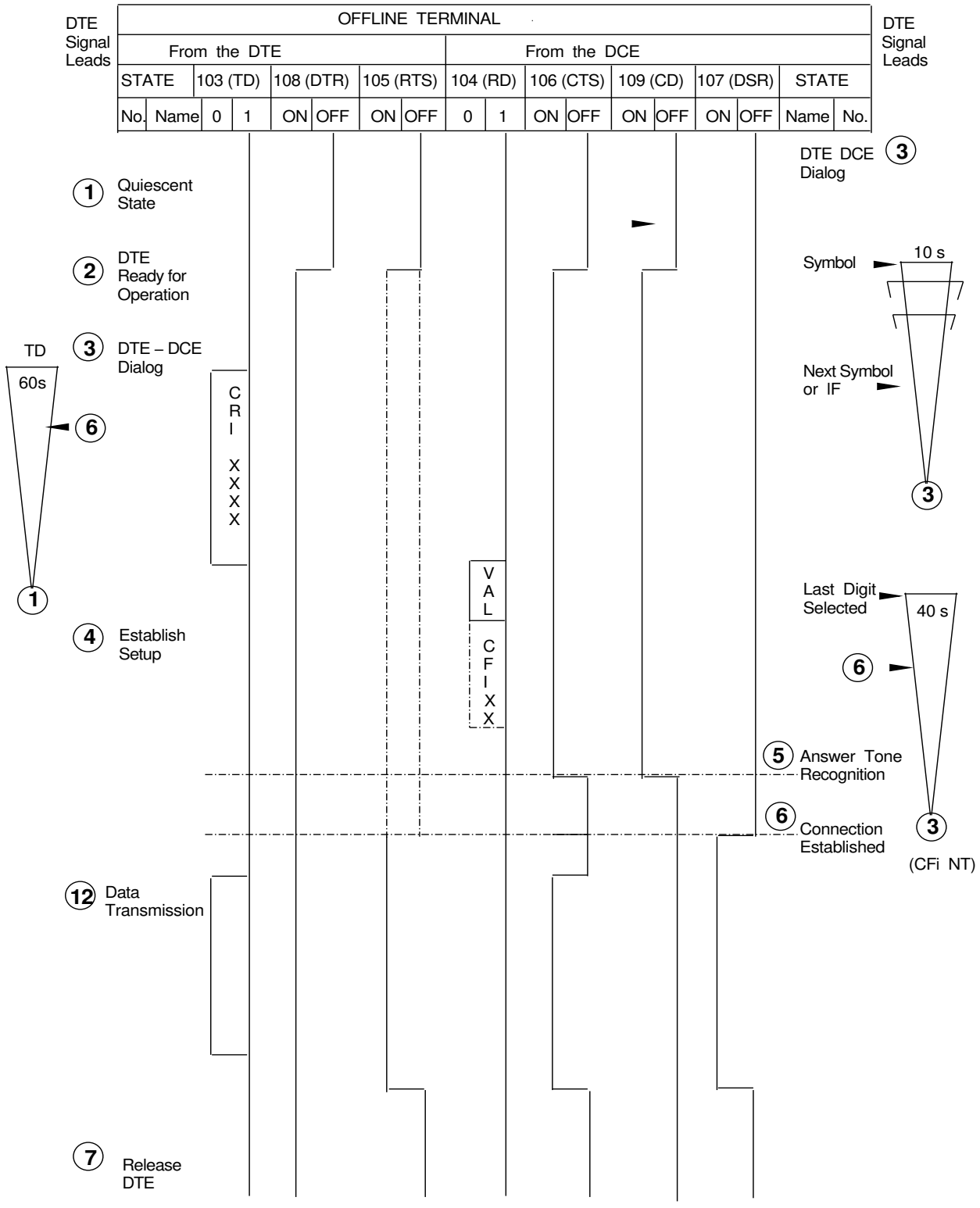
e. When the DCE seizes the line, circuit 125 (CI) goes OFF and the interface moves to state 13, "Line Seized".

f. On completion of connection procedure, the DCE moves to state 6, "Call Connected", and turns circuit 107 (DSR) ON.

g. Moving from this state to state 12, "Data Transfer", is not part of this standard. See DEC STD 052-2.

Figure 7 supplements information and procedures described in Figure 6 and subheads 2.2 *Interface Procedure at the Calling Data Station (Provisional)* and 3.0 *Line Procedures*.

Figure 7: DTE/DCE Timing Diagram



3 LINE PROCEDURES

3.1 LINE PROCEDURE AT THE CALLING DCE

a. Whenever the DCE has received the Call Request (see Figure 5), the DCE seizes the line by going "Off Hook".

b. Dialing may proceed when a dial tone has been detected, or after a fixed time delay. The value of this delay depends on the national network.

c. On completion of dialing, or, if possible, upon recognizing the other end going "Off Hook", an interrupted calling tone as specified in V.25 is transmitted to line.

d. During interruptions of the calling tone, the DCE monitors the line in order to detect call progress tones from the network and/or the 2100 Hz answering tone provided by the remote DCE. If no answering tone is detected within a time out, the DCE goes on hook and may issue an appropriate "Call Failure" indication. It may also issue a "Call Failure" indication upon recognition of specific signaling tones from the network.

e. When 2100 Hz has been recognized by the DCE for a period of 450 to 600 ms, the interrupted calling tone is discontinued by the DCE. The DCE turns circuit 106 (CTS) to the OFF condition.

f. The DCE monitors the line to determine the end of the 2100 Hz answering tone. When the DCE detects the absence of the 2100 Hz tone for 75 ±20 ms, it turns circuit 107 (DSR) ON, completing the connection procedure.

The policy for handling unsuccessful calls may be dependent on the national networks.

A first level handling by the Call Originating Data Station is not part of this recommendation. The first level handling may include "blocking", where initially unsuccessful calls are prohibited from making further attempts by either the DCE or DTE.

A second level handling, which could permit the Administration to trace erroneous calls when a subscriber complains, should be, (where required by the Administration), implemented in the manner specified under the following subhead (3.1.1).

3.1.1 Calling Station Identification

To enable the Administration to have means to trace the originator of erroneous calls, an identification message has to be transmitted on the line by the Call Originating Data Station.

3.1.2 Criteria for Transmission of Identification Information

The calling station identification information shall be transmitted after the transmission of the calling tone when:

a. The answering tone is not received within a time interval (Tl = 60s) from the end of the last digit dialed.

NOTE

T1 = 60s is a fixed value of the DBP (DBP = German Post Office).

NOTE

For the DBP requirements that are outside the scope of this standard consult the DBP DATEL-Handbuch, part 4, section 5.4 "Zusaetzliche Bedingungen fuer die automatische Wahl nach CCITT-Empfenlung V.25bis"

b. The answering tone is not received within a time interval T1 from detection of answering at the remote end.

The choice of time out and their durations is dependent on national regulations.

Whenever the DCE enters the transmission of the identification information on the line, it will defer the execution of any Clearing Request made by the DTE which would put circuit 108_CD_DTR in the OFF condition. The DCE continues the deferment until transmission of the identification information is completed. The complete identification information shall be transmitted successively three times or more.

3.1.3 Modulation Method

The identification signal shall be asynchronously frequency modulated with the frequencies 1300 Hz (mark) and 2100 Hz (space) in such a way that it is possible to receive this signal with a modem according to Recommendation V.23 (600/1200-Baud Modem Standardized for use in the GSTN, hereafter referred to as V.23). The modulation rate shall be 1200 bauds. In cases where this rate cannot be realized, a modulation rate of 300 bauds be used.

3.1.4 Format for Identification Information

The identification information shall be encoded according to ASCII with 1 start bit, 1 stop bit, and an even parity bit. The first digits of the identification number shall contain the country code of the subscriber's telephone number.

3.1.5 Implementation

In addition to the contents of this recommendation, the regulations of the national Administration must also be complied with.

The additional requirements may be:

a. Generation and storage of the identification number.

b. Complete structure and content of the identification number (except the first digits).

c. Recording and detection of the identification information.

3.2 LINE PROCEDURE AT THE CALLED DCE

a. When ringing is received on the line, the DCE turns circuit 125 ON and, where implemented, issues an "Incoming Call" indication if circuit 108.2 (DTR) and 106 (CTS) are in the ON condition.

b. If circuit 108.2 (DTR) is ON, the DCE proceeds to go "Off Hook".

c. If circuit 108.1 or circuit 108.2 (DTR) is OFF, the DCE waits for circuit 108 to come ON, and then proceeds to go "Off Hook". If circuit 108 is not turned ON, then the call is not answered.

d. If necessary, the DCE turns circuit 106 (CTS) OFF when it goes "Off Hook".

e. After going "Off Hook", the DCE maintains silence on the line for a period between 1.8 and 2.5 seconds, then transmits a 2100 Hz Answer tone (According to CCITT Recommendation G.l64 Echo Suppressors, the tolerance will be ±15 Hz) for a period of 3.3 ±0.7 s.

f. At the end of the 2100 Hz transmission, and after a silent period of 75 ±20 ms, the DCE turns ON circuit 107 (DSR), completing the connection procedure.

4 MANUAL CALLING AND ANSWERING

The operational procedures for manual calling to an automatic answering data station, and automatic calling to a manual answering data station, are the same as detailed in V.25 Sections 4 and 5, with the exception that circuit 106 (CTS) has to be turned OFF before turning ON circuit 107 (DSR), in the 108.2 (DTR) Addressed call and Answering Mode.

Where the called Data Station is expected to have a manual answering mode, this may be indicated to the calling DCE. The method for doing this is under further study.

APPENDIX A

MAINTENANCE CAPABILITIES

A.1 INTRODUCTION

In order to enable a fault to be located in either the DTE or the DCE, the DTE should not be involved in the test. The test may be initiated by pressing a button on the DCE, whereas indication of the test result may be presented by means of a visual indicator.

The actual test consists of two stages: a DCE self test and a test in cooperation with a maintenance center. In which order these two stages are activated is not specified in this recommendation. The test of the modem part of the DCE will not be part of this recommendation, but should be performed separately according to V.54 *Loop Test Devices for Modems*, hereafter referred to as V.54).

A.2 DCE SELF TEST STAGE

In this stage the DCE will test as many functions and as much hardware as reasonably possible. The test should comprise a loop at the DTE-DCE interface similar to V.54 loop 2 including all circuits normally exercised during the call set up and clear phase. Further parts of the test depend on the DCE implementation. In case of a microprocessor-based design, a functionality test of the CPU, RAM and ROM would be appropriate.

A.3 DCE TEST WITH MAINTENANCE CENTER

In this stage the procedure is as follows:

a. The user manually sets up a call with the maintenance center (MC).

b. On answering the call the MC will send a 2100 Hz tone of appropriate length to ensure detection by the DCE.

c. As soon as the 2100 Hz answering tone is detected, the DCE should be connected with the line.

d. After detecting the end of the 2100 Hz answering tone, the DCE starts sending the dialing digits 1, 2, 3, 4, 5, 6, 7, 8, 9, 0 in accordance with the regulations of the administrations involved.

NOTE

They shall have the same spacing as during automatic call set-up.

e. In case not all numbers are detected faultlessly, the MC will send a 2100 Hz tone for 0.4 ±0.1 s, indicating a negative test result and disconnects from the line.

f. On detecting the 2100 Hz tone, the DCE will end the test procedure and indicate a negative test result.

g. If all numbers are received correctly, the MC will send a 1300 Hz tone for 0.4 + 0.1 s and starts sending signaling tones towards the DCE to be defined by the Administration involved.

NOTE

For pulse dialing the open contact shall be coded by a 2100 Hz tone and the closed contact by no signal at all.

h. At the end of this sequence a 2100 Hz tone will be sent for 0.4 ±0.1 s and the MC will disconnect.

i. The DCE receiving the 2100 Hz tone will give a positive or negative indication, depending on the test result and ends the procedure.

APPENDIX B

REFERENCED DOCUMENTS

B.1 EL-Class Digital Documents

EL-Class Number	Document Title
EL-00052-00	*DEC STD 052-0 Operational Requirements for Serial Terminals and Serial System Interfaces Operation as DTEs Connected to EIA RE-232-D or CCITT V.28 Point-to-POINT Modems: Definitions and Terminology*
EL-00052-01	*DEC STD 052-1 Operational Requirements for Serial Terminals and Serial System Interfaces Operating as DTEs Connected to EIA RS-232-D or CCITT V.28*
EL-00052-02	*DEC STD 052-2 Electrical Requirements for Binary Interfaces that Conform to EIA RS-232-C or CCITT V.28*

Use VTX SMC to order copies of EL-class documents from Standards and Methods Control. Send distribution questions to JOKUR::SMC or call DTN: 234-4423.

B.2 Other Documents

Document Number	Document Title
CCITT Volume VIII	*Recommendation V.24 List of Definitions for Interchange Circuits Between Data Terminal Equipment and Data Circuit Testing Equipment*
CCITT Volume VIII	*Facicle VIII.1 - Rec.V.25bis*
CCITT Volume VIII	*Recommendation G.164 Echo Suppressors*

Copies of these documents can be obtained from:
ITU International Telecommunications Union, Geneva

DATEL-Handbuch, part 4, section 5.4 "Zusaetzliche Bedingungen fuer die automatische Wahl nach CCITT-Empfenlung V.25bis

Copies of this document can be obtained from:

Postamt Marburg

Postfach 1100
D-3550 Marburg, W-Germany

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